UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
25 FUNSTON ROAD
KANSAS CITY, KANSAS 66115

MEMORANDUM

September 20, 1990

SUBJECT: Request for a Removal Action at the Dugan & Helterbrand Company Site, Marshfield, Missouri

CERCLIS ID #: MOD086919248

SITE ID #: FQ

CATEGORY OF REMOVAL: This is an **emergency** removal action. The action will mitigate an immediate and serious public health threat from exposure to cyanide wastes from a defunct silver recovery facility.

NATIONALLY SIGNIFICANT: No

FROM: Paul Doherty
Chief, SINV/EP&R/ENSV

TO: Morris Kay
Regional Administrator

THRU: Billy J. Fairless, Ph.D.
Director, ENSV

I. ENDANGERMENT FINDING

The Dugan & Helterbrand Company (D&H) recovered silver from photographic and x-ray film using a cyanide stripping and electroplating process. The operations at the plant ceased after sewer service was disconnected by the local municipality. Local officials contacted the Missouri Department of Natural Resources (MDNR) after liquid was observed running off the property. The building was found to contain approximately 35,000 gallons of waste cyanide stripping/electroplating solution in 14 process tanks, waste cyanide stripping/electroplating sludges and tank bottoms in tanks and drums, and caustic chemicals used in the recovery process. At the request of MDNR, EPA responded to the site on September 11, 1990.

EPA investigators observed that the cyanide stripping/electroplating tanks were leaking solution onto the floor of the process building. The cyanide solution was observed

running out of the process buildings, pooling on the concrete slab between buildings, and flowing off the property into a drainage ditch to the south of the facility. The drainage ditch flows by a residential area located approximately 200 feet west of the facility. Drainage from the site eventually flows to Turnbo Creek located three-quarters of a mile south of the site. Turnbo Creek discharges to the James River. The site is not secured and local police have responded to reports of neighborhood children trespassing on the premises.

Conditions presently exist at the site which, if not addressed by the response actions documented in this Action Memorandum will lead to an imminent and substantial endangerment to the public health or welfare or the environment.

II. BACKGROUND

A. Site Description

1. Physical Location

The D&H site is located at 190 George Street, Marshfield , Missouri. Marshfield is located in Webster County approximately 20 miles east of Springfield, Missouri on Interstate 44.

The legal description of the property is Southeast 1/4, Southeast 1/4, Northwest 1/4, Section 9, Township 30 North, Range 18 West.

2. Site Characteristics

The D&H site is located in a residential/light industrial area on the southwest edge of Marshfield, Missouri. The site is bordered by pastureland to the north, a residential area to the west, and light industrial businesses to the south and east. There is a shopping center approximately 1000 feet to the northeast. A railroad line borders the property to the south and separates it from the light industrial areas to the south and east.

The property is approximately one acre in size. There are four operation buildings on site which sit on a concrete slab. The largest two buildings contain the rectangular tanks/vats where the silver recovery operation occurred. As described in D&H's State Resource Recovery Facility Application Form, the west process building contains eight 2,500-gallon vats, a shop area, an office area, a chop room where film was cut for processing, a film storage, and drum storage area. The east process building contains ten 2,500-gallon process vats and an attached drum storage room. A smaller chemical storage building and smelter building are located between the larger process buildings.

3. National Priorities List Status

The D&H site is not a National Priorities List (NPL) site. Consideration may be given to scoring the site on the Hazard Ranking System pending an investigation of potential groundwater releases.

4. Supporting Documentation

Photographs of the site and maps showing the facility location and site layout are attached.

B. State and Local Authorities' Roles

1. State and Local Actions To Date

The D&H Company was incorporated in the State of Missouri in 1980 and began operations in the town of Northview, located 6 miles southwest of Marshfield, Missouri. The operation was moved to the Marshfield site sometime in the early 1980s. The Marshfield facility was first inspected by the State of MDNR in April 1983. According to the report prepared by MDNR after the inspection, the purpose of the inspection was to "provide technical assistance and to determine the compliance status of the facility." As a result of this inspection, the facility applied for and received state certification as a resource recovery facility (#RR 082) in January 1984. In March 1984, MDNR approved a special waste disposal permit for D&H for disposal of treated film chips at the Webster County Sanitary Landfill. In April 1985, following an inspection of the facility, it was cited by MDNR for improper disposal of untreated or improperly treated cyanide-contaminated film chips at the sanitary landfill. An agreement between MDNR and D&H was reached which, in the future, will require D&H to treat and test the film chips to ensure cyanide concentrations were below 250 parts per million (ppm) before disposal at the local landfill in the future. A follow-up inspection by MDNR in September 1985, revealed no violations of state hazardous waste regulations. MDNR investigators reported that the facility had converted to an enzyme-recovery process and was now using the cyanide process only for unexposed film and lithographic materials which accounted for less than 10 percent of the film processed.

In 1984, an incident occurred where an apparent illegal discharge of cyanide and/or silver to the local sewer system resulted in a fish kill in the West Fork of the Niangua River. The City of Marshfield was cited by the MDNR for violation of their National Pollution Discharge Elimination System permit. Because D&H's process involved both cyanide and silver, the city suspected that D&H's operation may have been the source of the unauthorized release. Following this incident the City of Marshfield attempted to regulate discharges from the D&H facility

through an industrial pretreatment Baseline Monitoring Report. D&H claimed that the facility was exempted from the requirement and refused to provide the requested information to the city. According to the City Attorney, Bill Sims, the City of Marshfield began to monitor discharges from D&H using a sampling station located in a nearby sewer manhole. When D&H did not comply with the city's request for a Self Monitoring Report, the city revoked D&H's waste discharge permit on July 16, 1990. Shortly after the physical disconnection of D&H's sewer service, the facility ceased operation. Cyanide stripping/electroplating solution, process residues and chemicals were left on site.

On August 23 and 27, 1990, following complaints from local officials, the Springfield office of MDNR conducted an inspection of the facility. Based on the findings of this investigation, MDNR activated their state "Superfund" clean-up contractor on September 10, 1990, to perform preliminary site stabilization work by draining leaking tanks. On September 11, 1990, the state requested that EPA provide assistance in securing and cleaning up the site.

2. Potential for Continued State and Local Response

The State of Missouri has requested that the EPA assume responsibility for performing the cleanup.

C. Other Actions To Date

1. Previous Actions

On September 11, 1990, EPA investigators visited the site and documented site conditions and the release of cyanide waste to the environment. EPA sent notice letters to Mr. Joe Helterbrand as registered agent for the corporation and in his personal capacity. Mr. Helterbrand is known to have been the day-to-day manager at the facility and has been the person contacted by MDNR and the city regarding the events described in Section II.B.1., above.

2. Current Actions

On September 14, 1990, after consulting with regional management and counsel, a Delivery Order was issued to EPA's Emergency Response Cleanup Services contractor to provide 24-hour security over the weekend. Mr. Joe Helterbrand did not respond to federal Notice Letters issued on September 14, 1990. The letters contained a response time and stated that the lack of response would indicate to EPA that the recipient was not interested in performing the activities outlined in the letter. EPA has mobilized to secure the site and complete cleanup and proper

disposal of off-site contamination and waste materials remaining on site. A more comprehensive Potentially Responsible Party search is in progress.

III. THREAT TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT

A. Incident/Release Characteristics

The D&H facility recovered silver from the emulsion on cellulose acetate or plastic film base (i.e., waste lithographic, photographic, and radiology film). From its initial operation until 1985, D&H employed a cyanide stripping/electroplating process to recover the silver. In 1985, the company began to use an enzyme process for most of their operation. The facility continued to use the cyanide process for certain lithographic and unexposed film which accounted for approximately 10 percent of material processed.

Both operations required that the film be first cut in a hammer mill to one-half-inch by one-inch size. In the cyanide process the film chips were then placed in a vat and sodium cyanide was added. The reaction formed a silver cyanide complex which was pumped through an electroplating tank were the silver was deposited on the cathode electrode. Extracted silver was smelted on site into silver ingots to be sold.

Regenerated sodium cyanide from the electroplating bath was recycled for reuse in another reaction tank. The spent film chips were then rinsed with a sodium hypochlorite solution to convert residual cyanide to cyanate which further breaks down to carbon dioxide, water, nitrogen, and chlorine. Treated film chips were then, theoretically, free of cyanide and were considered by the state to be nonhazardous for disposal purposes. The rinse water was recycled for reuse in other tanks. The process was designed as a "closed" system with, theoretically, no discharges of plating bath solution or rinse water necessary. When the company converted to the enzyme process, the cyanide process was kept operational to treat certain types of materials. When the company ceased operation, fourteen 2,500-gallon tanks of cyanide stripping/electroplating solution and process residues were left on site.

In the enzyme process, the cut film chips were placed in a rotating drum which immersed the chips in the enzyme solution. The enzyme solution was treated with a flucculant and the sludge containing the silver was smelted into ingots. Wastewater from the system was discharged to the sewer system.

In spite of company claims that the silver-recovery process operated without generating or discharging hazardous waste, the facility had a history of problems. In the summer of 1983, D&H attempted to discharge a quantity of cyanide solution to the

local sewer system. A backup in the system caused the sewer to overflow into an adjoining pasture. Exposure to the cyanide solution resulted in the death of six head of cattle.

An illegal discharge of cyanide and/or silver to the municipal sewer system in the fall of 1984 resulted in a fish kill on the West Fork of the Niangua River. Although the source of the discharge was never determined, the city believed that D&H was responsible. Periodic monitoring of D&H discharges at the nearest manhole by the City of Marshfield following this incident revealed cyanide concentrations up to 1,800 ppm in the sewer.

Sampling performed by the state in April 1985, revealed that film chips following "treatment" still contained cyanide at approximately 1,400 ppm and were therefore classified as hazardous by the state. Film chips prior to treatment contained cyanide at approximately 2,300 ppm. Recent analysis of cyanide bath solution contained in the tanks showed cyanide concentrations of 23,000 ppm cyanide. Process residue contained in fiber drums was found to contain cyanide at 3,700 ppm. Runoff from the site was found to contain cyanide at 36 ppm. Soil along the drainage ditch was found to be contaminated with cyanide at 107 ppm cyanide. Air monitoring performed by state investigators detected hydrogen cyanide gas near the process tanks up to 30 ppm using the MONOTOX hydrogen cyanide meter. (Although the MONOTOX HCN meter is slightly cross sensitive to other gases such as HCl, the meter reading is accepted as a reliable indication that hydrogen cyanide gas has been released.

B. Quantities and Types of Substances Present

The D&H facility contains eighteen 2,500-gallon tanks. At least 14 of these tanks contain cyanide-contaminated stripping solution (F009). The remaining tanks contain material associated with the enzyme-recovery process. There is also an unknown quantity of cyanide-contaminated residues in the bottom of these tanks and stored in drums on site (F008). Also, untreated or improperly treated film chips may be Resource Conservation and Recovery Act (RCRA) hazardous waste based upon cyanide reactivity (D003) or cyanide content (P030). Runoff of cyanide solution from leaking tanks has flowed off site and has contaminated an unknown quantity of soil. In addition to cyanide-contaminated material there are abandoned containers of sodium cyanide (P106) and caustic materials (D002) formerly used in the recovery process.

While D&H was operating the facility, it may have been exempt from RCRA regulation as a Resource Recovery Business which discharged to the local publicly owned treatment works. However, the incidents described above indicate that D&H may not have been in compliance with applicable statutes and regulations. Cyanide and other process wastes which remain on site are now subject to

the requirements of RCRA. Additionally, the facility is no longer operating and Mr. Helterbrand has told state investigators that he does not intend to arrange for proper disposal of the hazardous substances or other materials remaining on site.

C. Threats To Public Health or Welfare

The major threat posed by the site is the potential for direct human contact and/or exposure to cyanide-bearing wastes. The site is located in a residential/light industrial area and is not secured against unauthorized entry. People may be exposed to the contaminants via dermal contact, by inhalation, and possible ingestion. It has been documented that trespassers have been on the property recently. A release of hydrogen cyanide gas has been measured by state investigators, and leaking overflowing containers of plating solution were observed during a site inspection by EPA.

Hydrogen cyanide and its simple salts, such as sodium cyanide, are highly toxic by all routes of exposure. Many reports are available regarding acute poisoning in humans. Hydrogen cyanide vapor is an irritant at very low concentrations, is considered dangerous at 20 ppm, and is fatal by inhalation at concentrations of 100 ppm for one hour. Chronic exposure to low levels of cyanide salts has been reported to cause enlargement of the thyroid gland in humans, apparently due to inefficient elimination of cyanide metabolite thiocyanate. Because of its mechanism of action, inhibition of the electron transport system in oxidative phosphorylation, cyanide is acutely toxic to almost all forms of life.

D. Threats To The Environment

EPA has established a water-quality standard for the protection of freshwater aquatic life of 3.5 µg/l cyanide as a 24-hour average. Cyanide concentrations in freshwater should not exceed 52 µg/l even on a short-term basis. Both standards have been exceeded in water collected from the drainage ditch south of the facility (94 µg/l). Water from this ditch flows to Turnbo Creek which discharges to the James River. During periods of wet weather, contaminated runoff from the facility increases suggesting that pockets of cyanide solution are present beneath concrete slabs and are flushed out by rainfall events. Leaking cyanide solution may also be leaching to, and contaminating, the local groundwater.

The present site conditions pose a significant threat that meet the criteria for response actions under 40 CFR Part 300.65(b)(2), namely:

· Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations

· Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release

· Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released

IV. ENFORCEMENT

A. Potentially Responsible Parties

A potentially responsible party (PRP) search, including a title search, has been initiated by EPA but has not been completed.

The operator of the site is Dugan & Helterbrand Company, Inc. Mr. Joe Helterbrand is the registered agent for service. This is believed to be a closely held corporation with family members owning all the stock. This belief is based on information obtained from local officials. Information requests will be sent in order to obtain all necessary information regarding the corporation. It is also reported by local officials that Mr. Helterbrand worked at the plant on a daily basis and was apparently in charge of all the operations on a day-to-day basis. EPA issued notice letters to Mr. Helterbrand personally and as a registered agent for the corporation on September 14, 1990.

The property (real estate), on which the plant is located is apparently owned by Mrs. Etolia Dugan who is the mother-in-law of Joe Hilterbrand. A notice letter will be sent to Mrs. Etolia Dugan pending confirmation of her status as owner of the property.

Part of the operating capital for D&H was obtained by Mr. Joe Helterbrand through a $600,000 loan secured through the Small Business Administration (SBA). As security, SBA required the record owners of the property to sign over a Deed of Trust for the property. It has been reported that Mr. Helterbrand has defaulted on the SBA loan but that the SBA has not foreclosed on the D&H property. The city attorney also reported that the property of Mrs. Etolia Dugan and Joe Helterbrand and Elaine Helterbrand, wife of Joe, had been foreclosed on by SBA.

B. Enforcement Strategy

EPA will consider cost-recovery actions pending a review of the final PRP search.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed Action Description

The following actions are proposed:

a. All leaking and overflowing containers will be immediately stabilized, drained or overpacked, and the contents disposed of.

b. 24-Hour security will be provided and the facility will be secured against unauthorized entry until all wastes are properly contained and secured, and the threat of direct exposure to the surrounding population is eliminated.

c. Cyanide bath solution which has leaked from the process tanks and is pooled on the surface both on site and off site will be collected, containerized, and disposed of.

d. Soil contaminated from cyanide runoff will be excavated, containerized, and disposed of.

e. Cyanide bath residues, sludges, and solids will be containerized and disposed of.

f. Process equipment and the building will be decontaminated and any resulting waste will be containerized and disposed of.

g. A study will be conducted to evaluate the potential for groundwater contamination.

2. Contribution To Remedial Performance

The proposed action will mitigate the present threat posed by unsecured hazardous wastes abandoned at this facility. Potential groundwater-contamination problems will be evaluated as part of the clean-up action.

3. Alternative Actions Description and Analysis of Alternative Technologies

Conventional off-site treatment and disposal is the most expeditious and cost-effective approach to cleanup of wastes at this site. Alternative technologies or on-site treatment technologies are not feasible given the quantity of waste involved and the emergency nature of the situation.

4. Applicable, Relevant and Appropriate Regulations

A request will be sent to the State of Missouri to identify state Applicable, Relevant, and Appropriate Regulations (ARARs).

Known ARARs at this time are:

- RCRA and regulations promulgated thereunder at 40 CFR Parts 261-268
- Clean Water Act and regulations promulgated thereunder at 40 CFR Parts 110, 131
- Safe Drinking Water Act and regulations promulgated there-under at 40 CFR Parts 141-143
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) - The National Contingency Plan: 40 CFR Parts 300
- Occupational Safety and Health Act: 29 CFR Part 1910

Other ARARs may be identified as more information regarding substances at the site becomes available. To the extent practicable, all ARARs will be complied with during this removal action.

5. Project Schedule

Arrangements to provide temporary 24-hour site security were made on September 14, 1990. Clean-up action was initiated on September 17, 1990, following the determination of nonresponsiveness from the owner by Regional Counsel. On-site clean-up activities are expected to take from 4 to 6 weeks to complete. Final disposal of waste materials may require several additional months to complete. Total project duration is projected to be 6 months.

B. Estimated Costs

Extramural Costs	
Regional Allowance Costs (ERCS)	
Labor	
Response Manager: 1 @ $90/hr x 360	$ 32,400
Crew: 6 @ $40/hr x 360	86,400
Lodging/Per Diem: 7 x $75/day x 42 days	22,000
Materials/Supplies	14,000
Equipment/Subcontractors	21,000
Transportation and Disposal	
Liquid: 35,000 gal x $3.50/gal	122,500
Sludges: 150 drums x $800/drum	120,000
Soil	10,000
Miscellaneous	10,000
Subtotal	438,300
Contingencies	87,700
Total ERCS Costs	$ 526,000
Program Support Costs	
TAT	$ 34,000
CLP	30,000
Total Program Support Costs	$ 64,000
Subtotal Extramural Costs	590,000
Extramural Contingencies	90,000
Total Extramural Costs	$ 680,000
Intramural Costs	
EPA Direct	$ 18,000
EPA Indirect	36,000
Total Intramural	$ 54,000
TOTAL PROJECT COSTS	$ 734,000

VI. EXPECTED CHANGE IN THE SITUATION SHOULD NO ACTION BE TAKEN OR DELAYED

The proposed actions for the D&H site should be taken immediately. Should these actions be delayed, the potential threats to human health and the environment will increase. In addition, these actions will minimize the potential for contaminants to be transported off site.

VII. IMPORTANT POLICY ISSUES

None

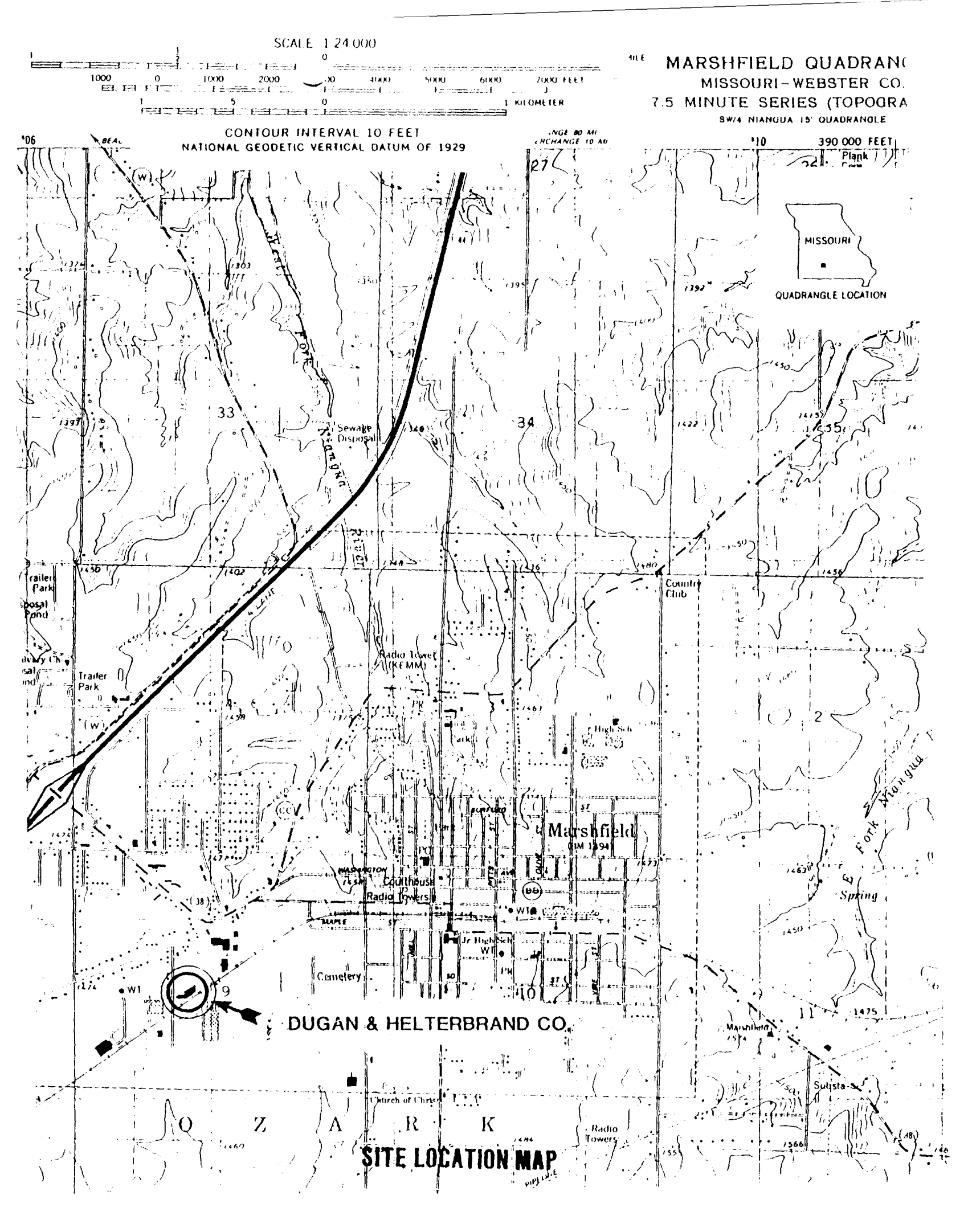
VIII. RECOMMENDATION

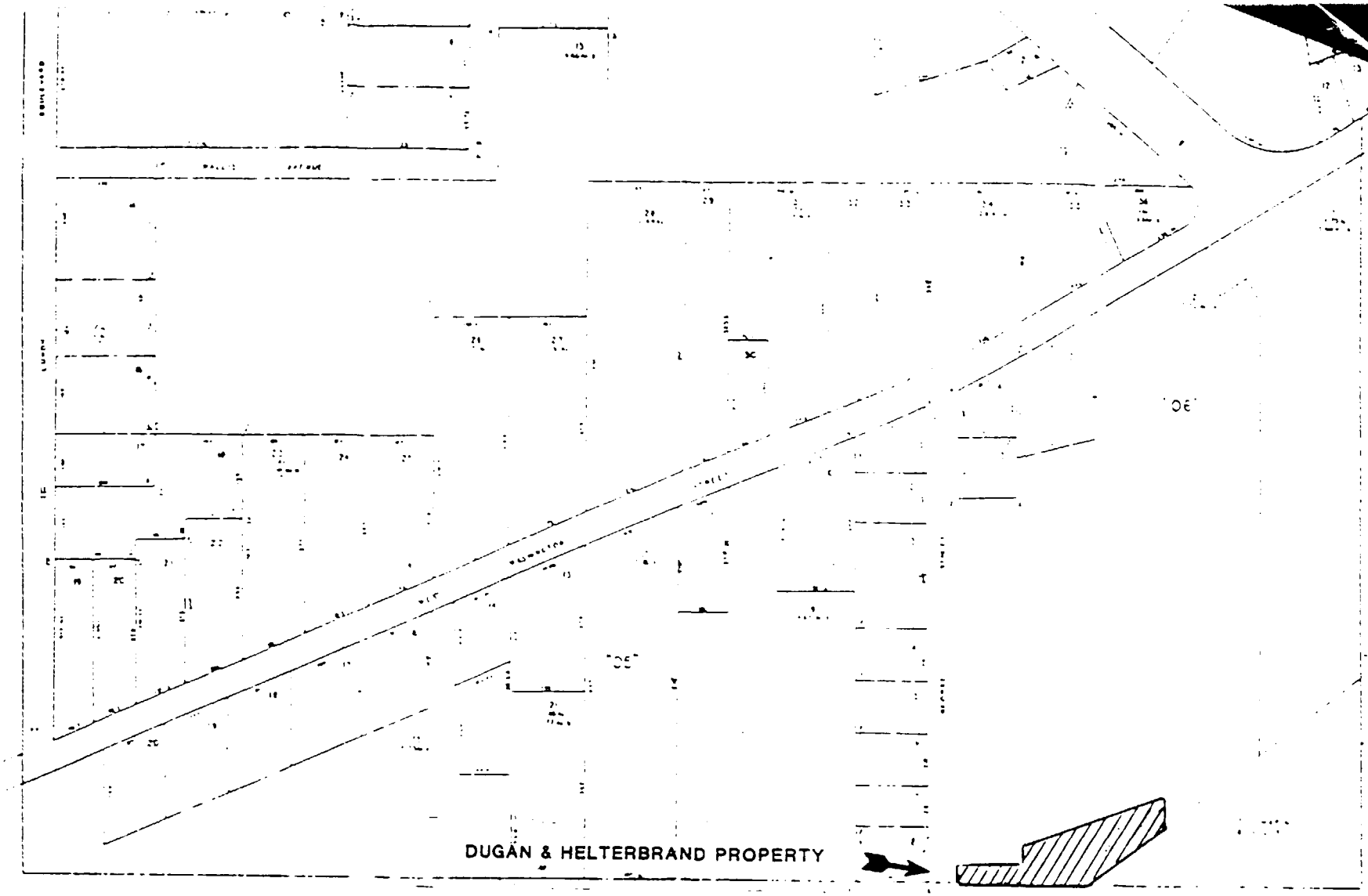
This decision document represents the selected removal action for the D&H site, Marshfield, Missouri, developed in accordance with CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record for this site.

Because conditions at the site meet the NCP Section 300.65 (b)(2) criteria for a removal, I recommend your approval of the proposed removal action. Obligations for the total project ceiling of $734,000 are planned for the 4th quarter FY90. Of this, $526,000 are allotted for Regional allowance.

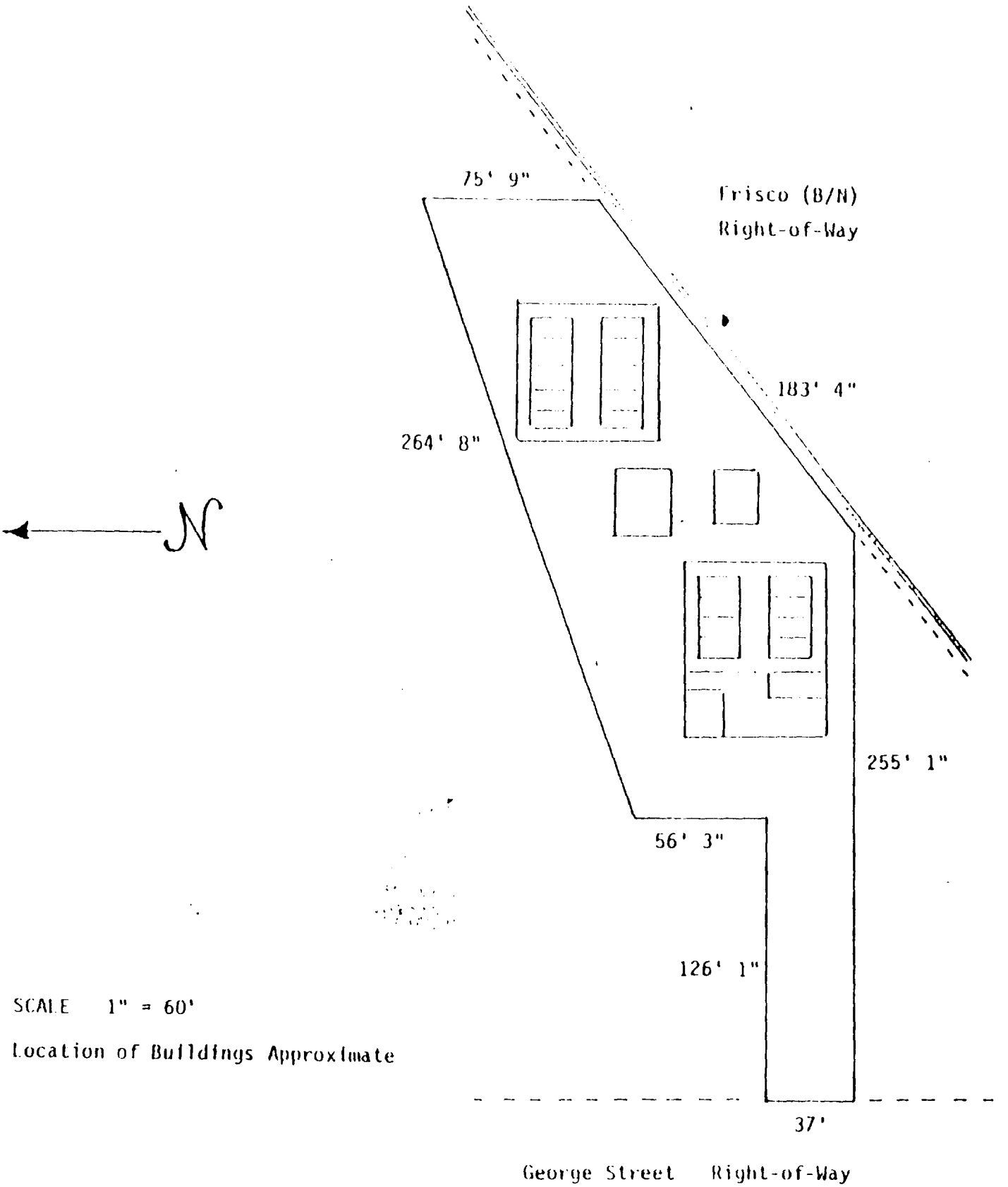
Signature William Leuc for M/K Date 9/21/90

Approve


SCALE 1:24 000
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER
MARSHFIELD QUADRANG
MISSOURI-WEBSTER CO.
7.5 MINUTE SERIES (TOPOGRA
SW/4 NIANGUA 15' QUADRANGLE
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
390 000 FEET
MISSOURI
QUADRANGLE LOCATION
Marshfield
Courthouse
Radio Towers
Radio Tower (KEMM)
Trailer Park
Country Club
Sewage Disposal
Cemetery
Church of Christ
Radio Towers
Jr High Sch
High Sch
Plank
Spring
Fork Niangua R
DUGAN & HELTERBRAND CO.
O Z A R K
SITE LOCATION MAP


DUGAN & HELTERBRAND PROPERTY

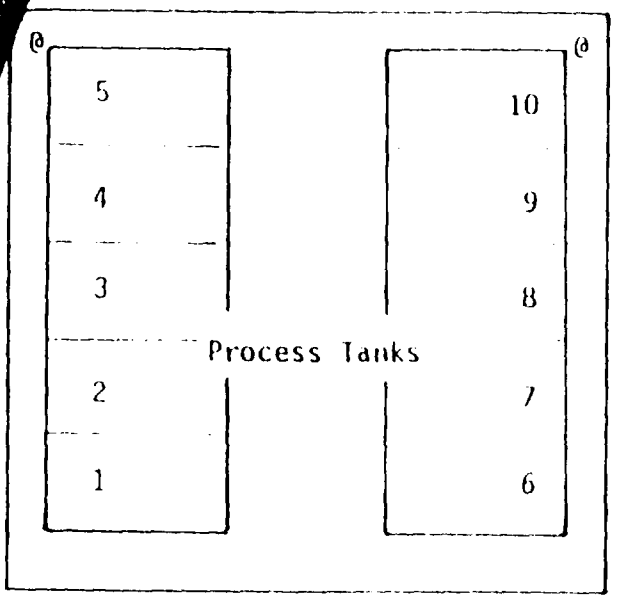
DETAIL OF PROPERTY



SCALE 1" = 60'

Location of Buildings Approximate

DETAIL OF BUILDINGS



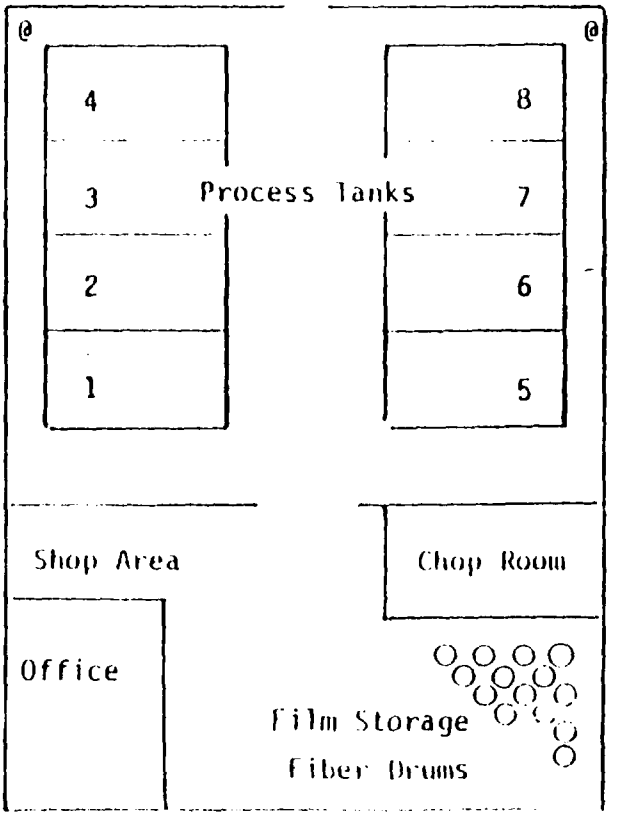
East Process
Building

@ Location of Sump Pumps
(2 Each Process Building)
Discharge to Empty Tank(s)

Chemical
Storage
Building

Smelting

West Process
Building
and Office



SCALE 1" = 20'
Locations and Dimensions
of Buildings Approximate

PHOTO NO.: 1

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION: East

SUBJECT: Cyanide stripping solution leaking from treatment tanks in the east process building.

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

PHOTO NO.: 2

PHOTOGRAPHER: Paul Doherty

WITNESS: Bob Wiggan

DATE: 9/11/90

TIME: AM

DIRECTION: West

SUBJECT: Cyanide stripping solution leaking from treatment tanks in the east process building.

FACILITY: Dugan & Helterbrand Co.
Marshfield, Missouri

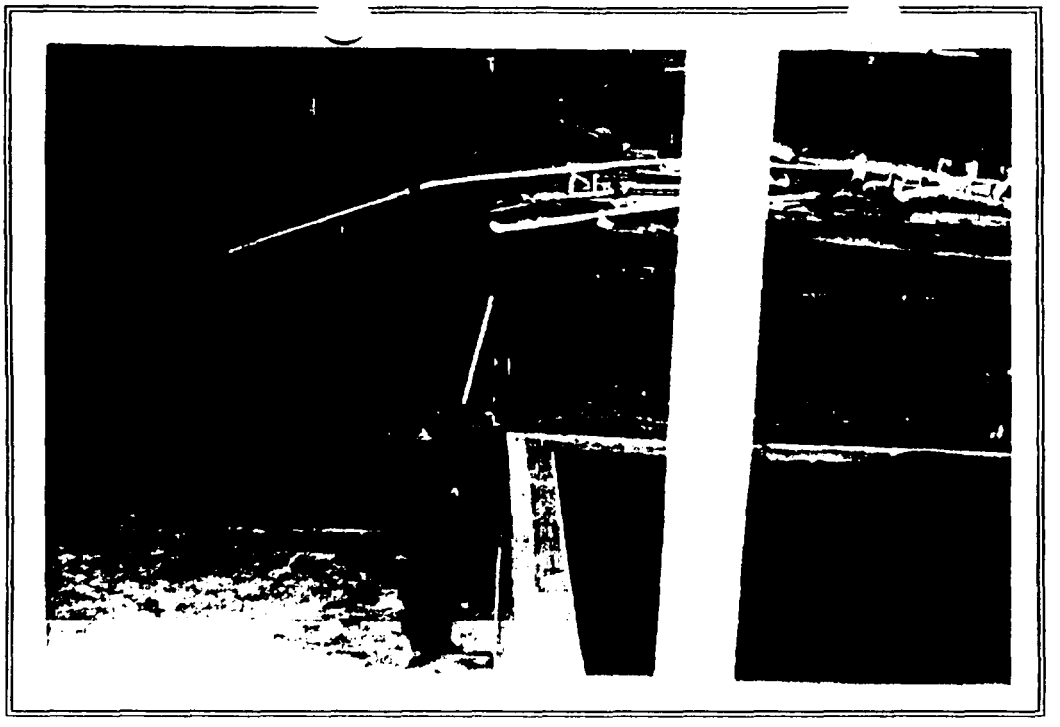


PHOTO NO.: 3

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION: North

SUBJECT: Treatment tanks in the east process building

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

PHOTO NO.: 4

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION: Northe

SUBJECT: Treatment tanks in the east process building

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

PHOTO NO.: 5

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION: North

SUBJECT: Leakage from tanks draining to floor sump being pumped back to the tanks.

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

PHOTOGRAPH NO.:

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

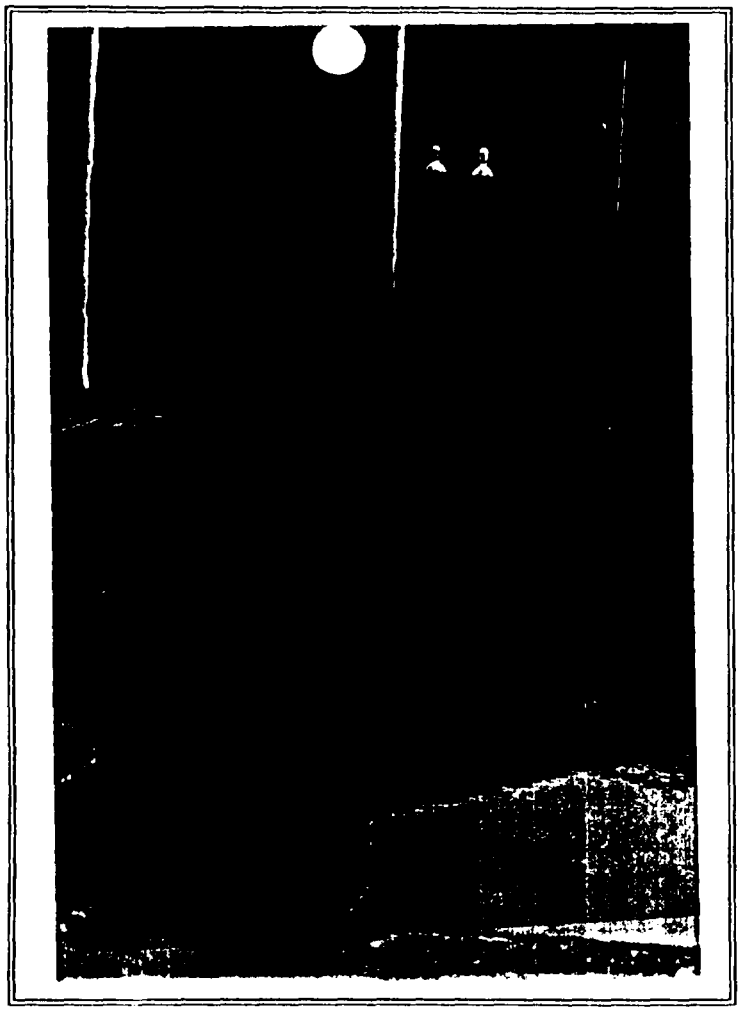
9/11/90

TIME: AM

DIRECTION: North

SUBJECT: Closeup of photo #5 above.

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri



PHOTOGRAPH NO.: 7

PHOTOGRAPHER: Paul Doherty

WITNESS: Bob Wiggans

DATE: 9/11/90

TIME: AM

DIRECTION: East

SUBJECT: Drainage from leaking process tank pooled on concrete slab.

FACILITY: Dugan & Helterbrand Co.
Marshfield, Missouri

PHOTOGRAPH NO.: 8

PHOTOGRAPHER: Paul Doherty

WITNESS: Bob Wiggans

DATE: 9/11/90

TIME: AM

DIRECTION: South

SUBJECT: Drainage from leaking process tanks flowing off property to the south towards railroad tracks.

FACILITY: Dugan & Helterbrand Co.
Marshfield, Missouri

PHOTO NO.: 9

PHOTOGRAPHER: Paul Doherty

WITNESS: Bob Wiggans

DATE: 9/11/90

TIME: AM

DIRECTION: North

SUBJECT: Drainage gulley leading from concrete slab.

FACILITY: Dugan & Helterbrand Co.
Marshfield, Missouri

PHOTO NO.: 10

PHOTOGRAPHER: Paul Doherty

WITNESS: Bob Wiggans

DATE: 9/11/90

TIME: AM

DIRECTION: North

SUBJECT: Close-up of photo #9.

FACILITY: Dugan & Helterbrand Co.
Marshfield, Missouri

PHOTO NO.: 11

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION:

Northwest

SUBJECT: Drainageway flowing west, located south of the west process building.

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

PHOTO NO.: 12

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION: West

SUBJECT: Off-site drainage of cyanide stripping solution draining west next to the railroad tracks.

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

PHOTO NO.: 13

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION: East

SUBJECT: Drainage of cyanide stripping solution south of the site.

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

PHOTO NO.: 14

PHOTOGRAPHER: Paul Doherty

WITNESS: Bob Wiggans

DATE: 9/11/90

TIME: AM

DIRECTION: West

SUBJECT: Close-up of down-gradient drainage shown in photo #13. View is to the west (i.e. opposite to that of photo #13.

FACILITY: Dugan & Helterbrand Co.
Marshfield, Missouri

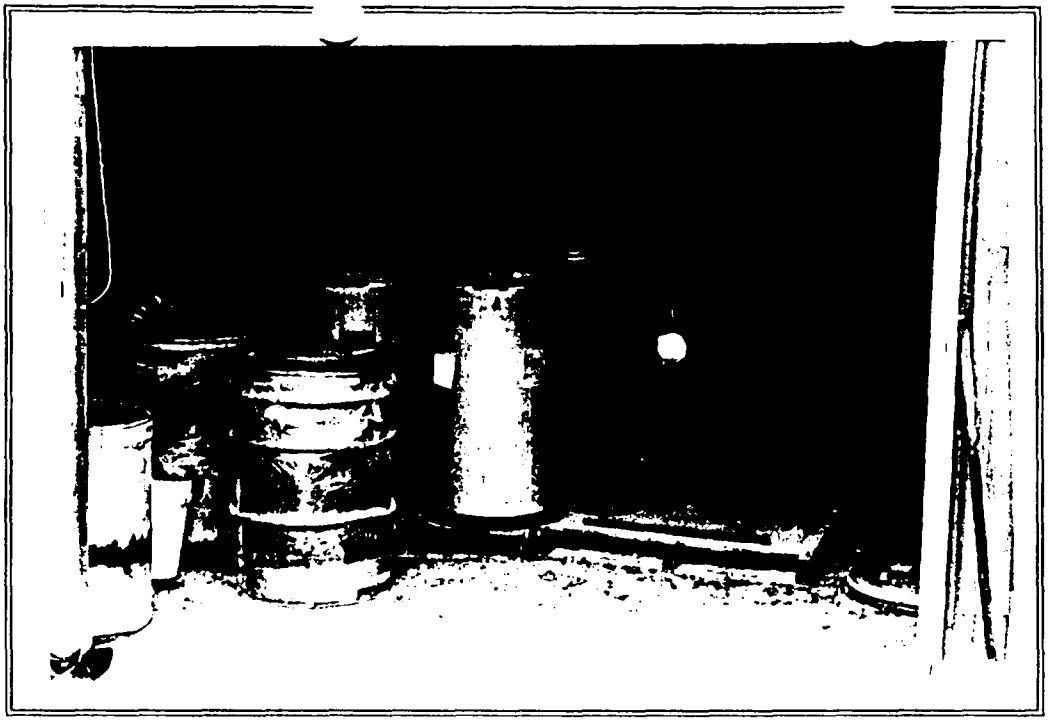


PHOTO NO.: 15

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION: East

SUBJECT: Fiber drums of cyanide salt residues, sludges and solids.

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

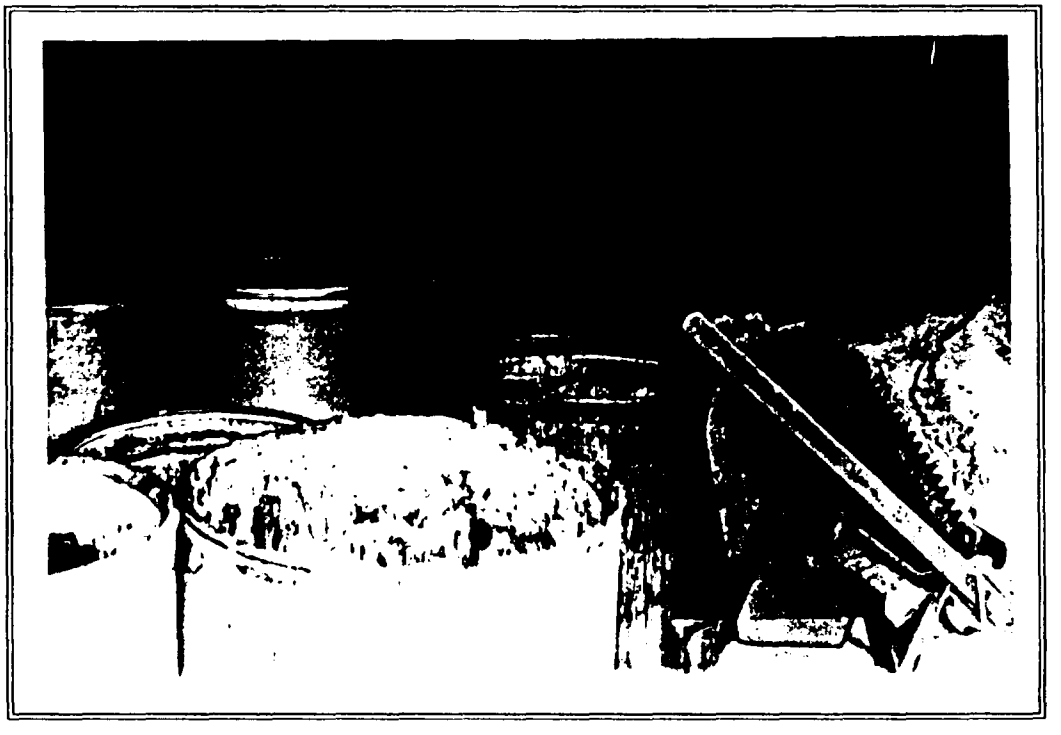


PHOTO NO.: 16

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION: East

SUBJECT: Closeup of fiber drums of cyanide salt residues.

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

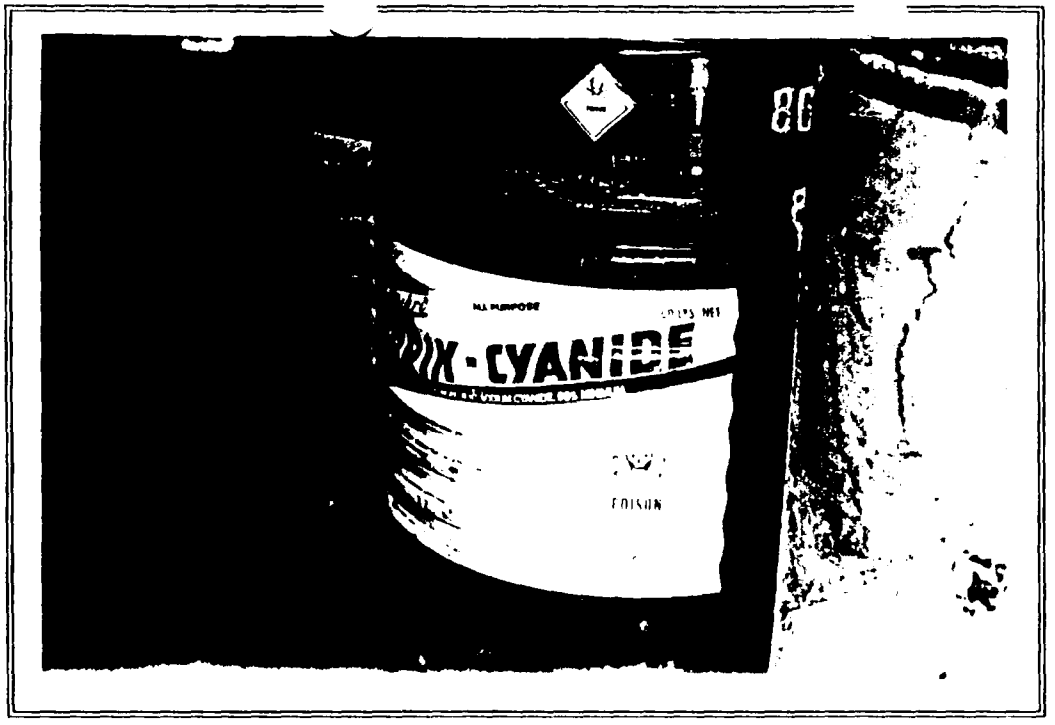


PHOTO NO.: 17

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION: North

SUBJECT: Drum of sodium cyanide.

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

PHOTO NO.: 18

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION: North

SUBJECT: Drum of sodium cyanide.

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

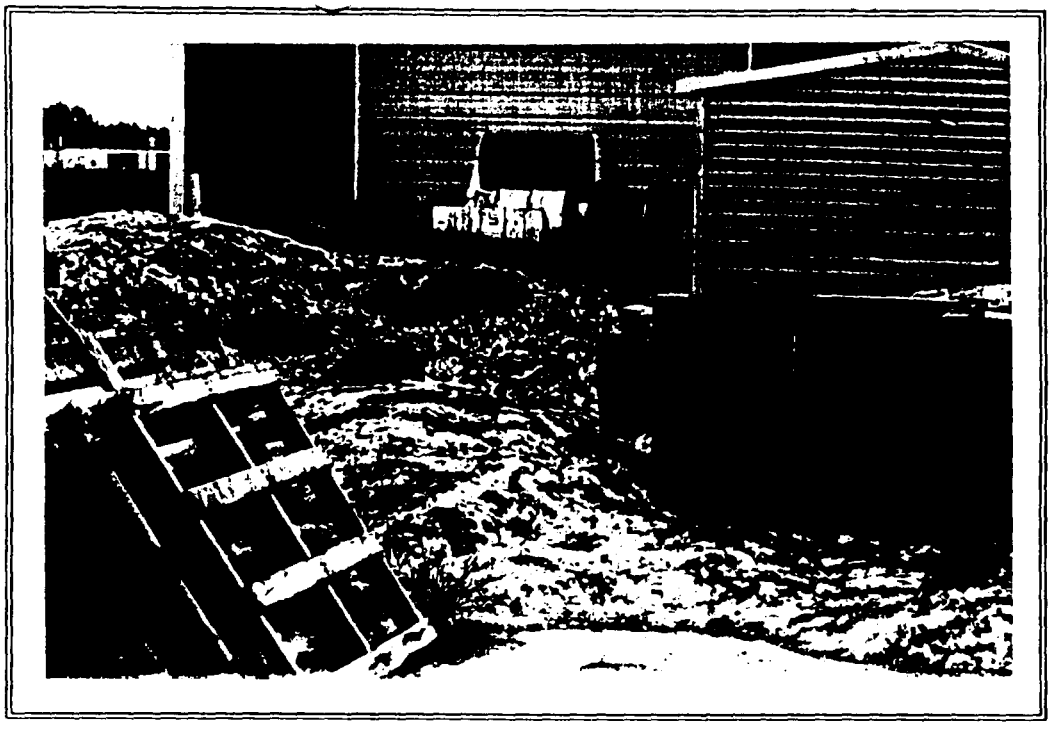


PHOTO NO.: 21

PHOTOGRAPHER:

Paul Dohert

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION: East

SUBJECT: Waste pile of "treated" film chips north of the chemical storage building.

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

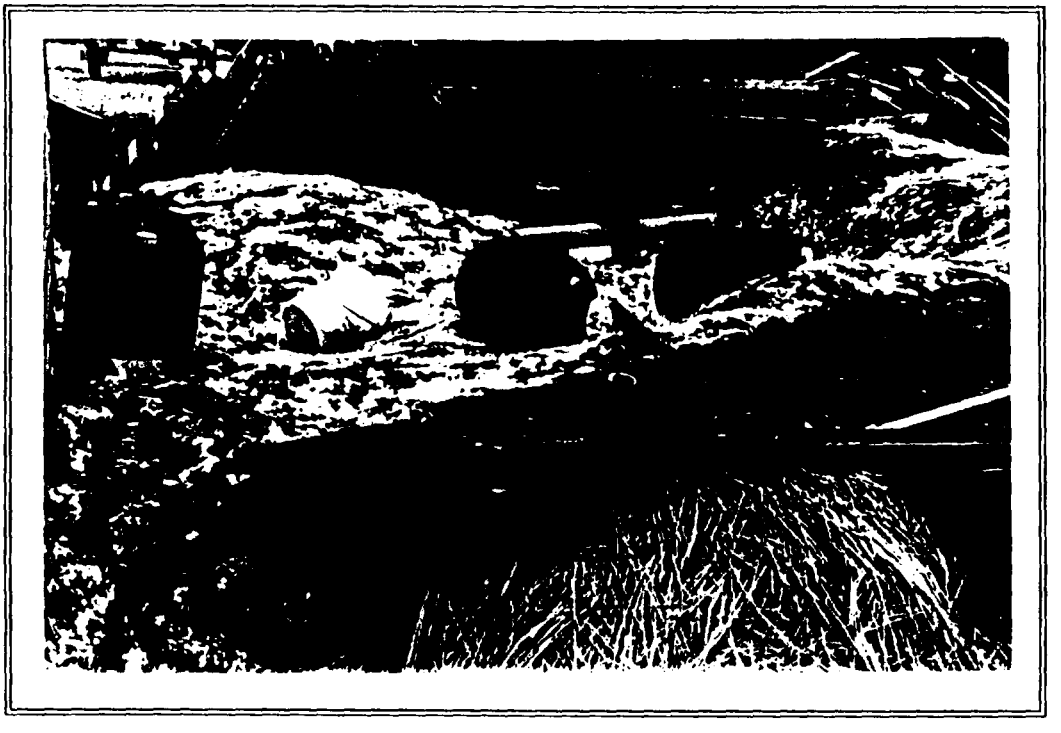


PHOTO NO.: 22

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION: West

SUBJECT: Waste pile of "treated" film chips north of the chemical storage building. View is to the west in the opposite direction as photo #21.

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

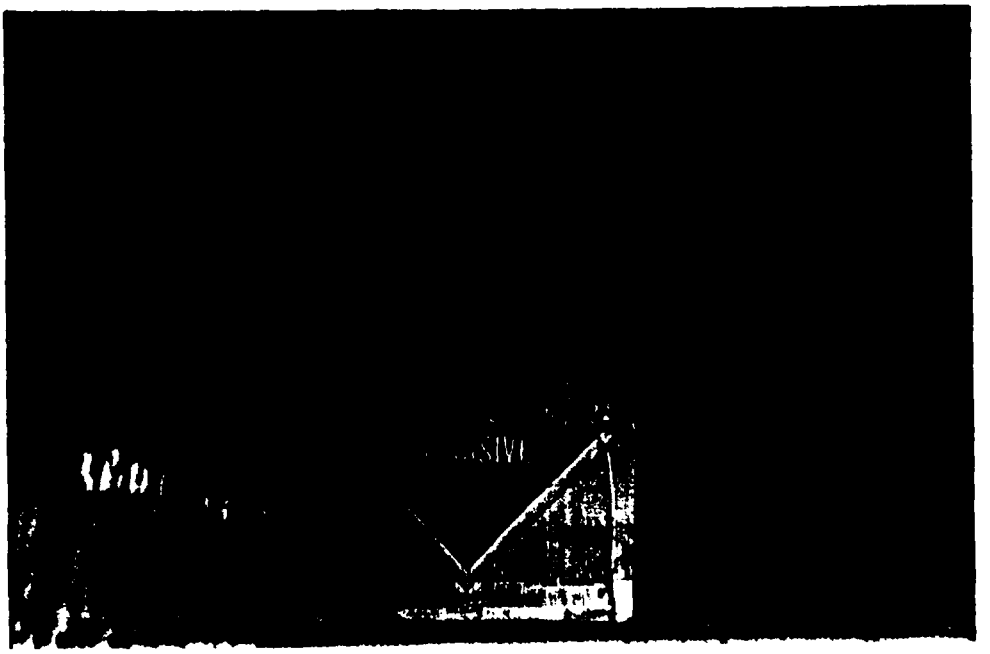


PHOTO NO.: 19

PHOTOGRAPHER:

Paul Doherty

WITNESS:

Bob Wiggans

DATE:

9/11/90

TIME: AM

DIRECTION: North

SUBJECT: Drum of caustic in west process building.

FACILITY: Dugan & Helterbrand Co., Inc., Marshfield, Missouri

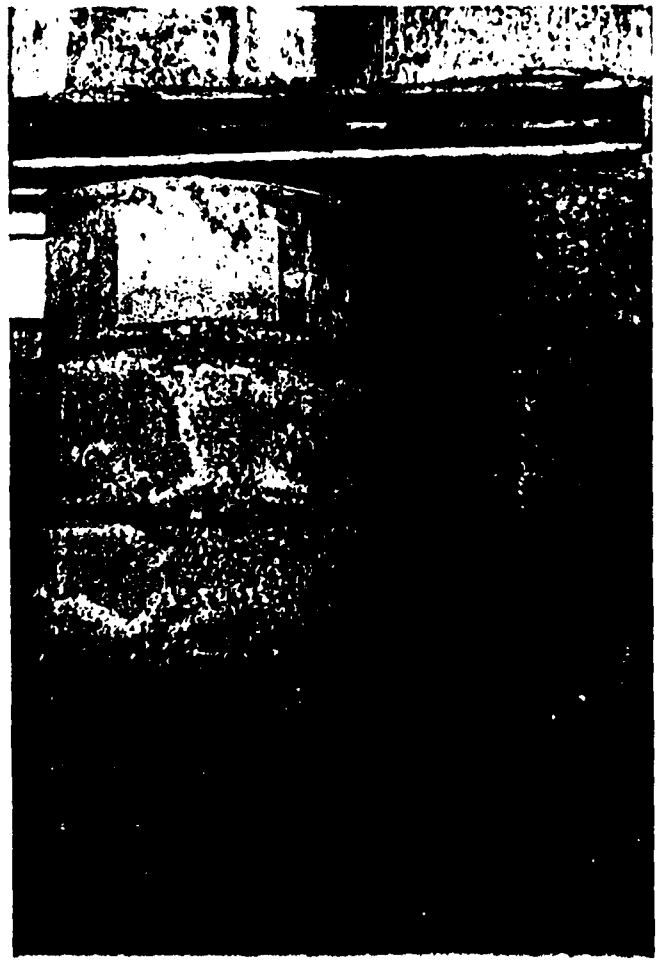


PHOTO NO.: 20

PHOTOGRAPHER: Paul Doherty

WITNESS: Bob Wiggans

DATE: 9/11/90

TIME: AM

DIRECTION: North

SUBJECT: Drums of untreated film chips stored in east process building.

FACILITY: Dugan & Helterbrand Co.
Marshfield, Missouri